

Jessica R. Murray

US Geological Survey
345 Middlefield Rd., MS 977
Menlo Park, CA 94025

(650) 329-4864
jrmurray@usgs.gov

CURRENT POSITION

Mendenhall Postdoctoral Researcher	<i>US Geological Survey, Menlo Park, CA</i> Supervisor: Wayne Thatcher	12/03 – present
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EDUCATION

Ph.D.	Geophysics, <i>Stanford University, Stanford, CA</i>	1/04
M.S.	Geophysics, <i>Stanford University, Stanford, CA</i>	6/00
Teaching Certification	Earth Sciences, high school level (MA and NH), <i>Dartmouth College, Hanover, NH</i>	12/96
A.B. with high Honors	Earth Sciences, <i>Dartmouth College, Hanover, NH</i>	6/96

HONORS AND AWARDS

Outstanding Student Paper Award	American Geophysical Union, Geodesy section, Fall Meeting 2002	1/03
Stanford Graduate Fellowship	Chevron Fellow	9/98-9/01
Magna Cum Laude	Dartmouth College	6/96
Phi Beta Kappa	Dartmouth College	6/96
Upham Award	(co-recipient) for original geological research	6/96
John Ebers Prize	for most deserving earth sciences student	6/96
Presidential Scholar	designates completion of an integrated research program and graduation with honors	6/96
Tucker Foundation Citation	for commitment to community service	6/96
Estwing Award	for outstanding junior earth sciences major	6/95
Francis L. Town Scientific Prize	for top sophomore in earth sciences	6/94

RESEARCH INTERESTS

I study crustal deformation using a variety of geodetic data. Broadly, this research concerns the spatio-temporal patterns of strain accumulation and release on faults and how such processes modulate the earthquake cycle. A specific area of focus is detection and kinematic modeling of transient deformation using frequent geodetic measurements. This work is geared toward an improved understanding of the stressing history on a fault, the conditions under which stable slip occurs, and the relation between transient slip, seismicity, and earthquake-induced stress changes. Another area of interest is the use of geodetic data to infer the spatial distribution of interseismic and coseismic fault slip and the insight this provides into earthquake recurrence. Technical aspects of my research have included the application of various methods for the inversion of geodetic data to estimate geophysical quantities, the use of Monte Carlo techniques to evaluate model parameters and obtain confidence intervals, and the use of Kalman filtering to image time-varying processes using a variety of deformation data types with complex error spectra.

PUBLICATIONS

PUBLISHED

- Langbein, J. *et al.*, Preliminary report on the 28 September 2004, M6.0 Parkfield, California, earthquake, *Seism. Res. Lett.*, 76, 1-17, 2005.
- Battaglia M., P. Segall, **J. R. Murray**, P. Cervelli and J. Langbein, The mechanics of unrest at Long Valley caldera, California. 1. Modeling the geometry of the source using GPS, leveling and 2-color EDM data, *J. Volcanol. Geotherm. Res.*, 127, 195-217, 2003.
- Murray, J. R.** and P. Segall, Testing time-predictable earthquake recurrence by direct measure of strain accumulation and release, *Nature*, 419, 287-291, 2002.
- Murray, J. R.**, P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Inversion of GPS data for spatially variable slip-rate on the San Andreas Fault near Parkfield, CA, *Geophys. Res. Lett.*, 28, 359-362, 2001.
- Murray, J. R.** and N. Oreskes, Uses and limitations of cathodoluminescence in the study of apatite paragenesis, *Economic Geology*, 92, 368-376, 1997.

IN REVIEW OR IN PREPARATION

- Murray, J. R.** and P. Segall, Spatio-temporal evolution of a slip-rate increase on the San Andreas fault near Parkfield, CA, in review, *J. Geophys. Res.*
- Bakun, W., et al., The 2004 Parkfield, California, earthquake: Implications for earthquake prediction, in review, *Nature*.
- Murray, J. R.** and P. Segall, Time-dependent inversion of geodetic data with seasonal noise, in prep., to be submitted to *J. Geophys. Res.*

NON-REFEREED

- Murray, J. R.**, P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Inversion of geodetic data for spatially variable slip-rate on the San Andreas Fault near Parkfield, CA, in Proceedings of the 3rd Conference on Tectonic Problems of the San Andreas Fault System, G. Bokelmann and R. Kovach, eds., *Stanford University Publications*, vol. XXI, p. 179-192, 2000.

CONFERENCES

AMERICAN GEOPHYSICAL UNION

- Murray, J.** and P. Segall, Slip in the 2004 Parkfield M6 Earthquake: Comparison With Previous Events and Implications for Earthquake Recurrence Models (*invited talk*), *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract S54B-03, 2004.
- Murray, J.**, Detection of time-varying deformation signals in continuous GPS data, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract G51D-01, 2004.
- B. Aagaard, **J. Murray**, G. Beroza, L. Blair, S. Haefner, A. Venkataraman, The 2004 M6 Parkfield Event as a Reference Earthquake, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract S51C-0170S, 2004.

Murray, J. R. and P. Segall, Analysis of data from multiple geodetic networks for a spatio-temporal fault slip history at Parkfield, CA during the 1990s, *Eos Trans. AGU*, 84, Fall Meet. Suppl., Abstract G31B-0706, 2003.

Murray, J. R. and P. Segall, Modeling small spatial and temporal variations in slip-rate using geodetic data, *Eos Trans., AGU*, 83, Fall Meet. Suppl., Abstract G22A-12, 2002.

Murray, J. R., and P. Segall, Analysis of previously unidentified transient fault slip using geodetic data (*invited talk*), *Eos Trans. AGU*, 83, West. Pac. Geophys. Meet. Suppl., Abstract SE21A-06, 2002.

Murray, J. R., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Assessing the time-predictable earthquake recurrence model at Parkfield, CA using geodetic data, *Eos Trans. AGU*, 82, Fall Meet. Suppl., F254, 2001.

Murray, J. R., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Inferring the moment deficit rate on the San Andreas Fault near Parkfield, CA through the inversion of geodetic data (*invited talk*), *Eos Trans. AGU*, 81, Fall Meet. Suppl., F1244, 2000.

Murray, J. R., P. Cervelli, W. Prescott, J. Svarc, P. Segall, Inversion of GPS measurements at Parkfield, CA for distribution of fault slip, *Eos Trans. AGU*, 80, Fall Meet. Suppl., F267, 1999.

Murray, J. R., W. Prescott, K. Wendt, J. Svarc, P. Segall, GPS measurements at Parkfield, CA 1993 - 1997, *Eos Trans. AGU*, 79, Fall Meet. Suppl., F184, 1998.

Reid, J. B., Murray, D. P., **Murray, J. R.**, McCoy, A., Jessup, M., Late Pleistocene crustal deformation in Northern Owens Valley, California interpreted from shorelines of Long Valley Lake, *Eos Trans. AGU*, 78, Fall Meet. Suppl., 141, 1997.

SEISMOLOGICAL SOCIETY OF AMERICA

Murray, J. R. and P. Segall, Transient slip on the San Andreas Fault: Inferences from geodetic data and the relation to moderate seismicity, *SRL*, 75, 270, 2004.

UNAVCO (UNIVERSITY NAVSTAR CONSORTIUM)

Murray, J. R. and P. Segall, Inferences of transient fault slip from geodetic data and the relation to moderate seismicity, UNAVCO annual meeting, Boulder, CO, 2004.

Murray, J. R. and P. Segall, Addressing seasonal noise when modeling transient deformation processes, UNAVCO/IRIS joint workshop, Yosemite, CA, 2003.

Murray, J. R. and P. Segall, Failure of the time-predictable earthquake recurrence model at Parkfield, CA, UNAVCO annual meeting, Colorado Springs, CO, 2002.

Murray, J. R., P. Cervelli, P. Segall, W. Prescott, J. Svarc, K. Wendt, GPS measurements at Parkfield, CA, 1992 - 1998, UNAVCO annual meeting, Boulder, CO, 1999.

SOUTHERN CALIFORNIA EARTHQUAKE CENTER

Murray, J. R., and P. Segall, Assessing the feasibility of modeling small temporal variations in slip-rate on the San Andreas Fault, SCEC annual meeting, Oxnard, CA, 2002.

INVITED TALKS

Murray, J. R. and P. Segall, Transient fault slip on the San Andreas Fault near Parkfield, CA and its relationship to moderate seismicity, Berkeley Seismological Laboratory, Berkeley, CA, May 4, 2004.

Murray, J. R. and P. Segall, Testing time-predictable earthquake recurrence by direct measurement of strain accumulation and release, Bay Area Geophysical Society, San Ramon, CA, Nov. 21, 2002.

Murray, J. R. and P. Segall, Testing time-predictable earthquake recurrence by direct measure of strain accumulation and release, Peninsula Geological Society, Stanford, CA, Oct. 15, 2002.

Murray, J. R., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Inferring the moment deficit rate on the San Andreas fault at Parkfield, CA, USGS Earthquake Hazards Team Seminar, April 26, 2001.

PRACTICAL EXPERIENCE

Matlab and C-shell scripting: Developed Matlab code for inversion, optimization, and Kalman filtering; wrote shell scripts for automated GPS data processing with GIPSY.

Geodetic surveying: Operated geodetic-grade GPS equipment and processed GPS data with the goal of millimeter-level accuracy. Assisted with gravity surveying and geologic mapping in Long Valley, CA using EDM instrumentation.

Mineral Cathodoluminescence: Used luminoscope and associated software for imaging cathodoluminescence in mineral samples and identifying its sources.

Thin section preparation: Produced thin sections from friable rock samples both by hand and using Logitech equipment.

Other experience: Compiled index for and assisted with editing of a textbook on dinosaur paleontology; Carried out initial preparation of tree ring samples for isotopic analysis.

TEACHING EXPERIENCE

Teaching Assistant, Stanford University	9/01 - 12/01
Earthquakes and Volcanoes, taught by Gregory Beroza and Paul Segall; duties included leading review sessions, holding office hours, grading homework.	

Teaching Assistant, Stanford University	1/01 - 3/01
Global Positioning System in the Earth Sciences, taught by Paul Segall; responsible for grading homework, GIPSY software instruction.	

Teacher, Swiss Semester	8/97 - 12/97
Taught geology at an abroad program for high school students, planned lessons, developed lab activities to be carried out during field trips.	

Teacher, Bristol Community College Upward Bound Program	6/97 - 8/97
Planned curriculum and lab exercises for geology, physics, and chemistry classes.	

Grader, Dartmouth College	3/96 - 6/96
Graded exams for environmental geology course.	

Tutor and Study group leader, Dartmouth College	9/95 - 6/96
Tutored individuals and led a study group for introductory physical geology course.	

SERVICE

Member, UNAVCO Education and Outreach Standing Committee	1/05 – present
Member, Plate Boundary Observatory Transform Siting Working Group	12/04 – present
Webmaster, Tectonophysics section, American Geophysical Union	11/02 – present
Academic Advisor, Stanford University	9/01 – 6/03
Advisor for seven first-year undergraduate students.	
Student Representative, Stanford University	4/01 - 4/02
Elected as Geophysics representative to Graduate Student Advisory Committee.	
Student Mentor, Stanford University	9/99 - 6/02
Mentor to first-year graduate students in Geophysics.	
WISP Mentor, Dartmouth College	9/95-6/96
Mentor for a first-year student through the Women in Science Project.	
